IN THE CLAIMS

1. (currently amended) An apparatus for determining a property of a fluid downhole comprising:

(a) a resonator ~~associated~~ in contact with the fluid downhole;

(b) a controller ~~which~~ that actuates the resonator; and

(c) a processor ~~which~~ that estimates the property ~~for~~ of the fluid ~~downhole~~ using a response of the resonator to the actuation.

2. (previously presented)The apparatus of claim 1, wherein the processor uses a chemometric equation for estimating the property.

3. canceled

4. (currently amended) The apparatus of ~~claim 1~~claim 2 wherein the processor ~~uses a function for deriving a chemometric equation from~~ correlates a measured resonator response ~~correlated~~ with known fluid property values.

5. (previously presented) The apparatus of claim 1, wherein the property is viscosity.

6. (previously presented) The apparatus of claim 1, wherein the property is density.

7. (previously presented) The apparatus of claim 1, wherein the property is dielectric constant.

8. (previously presented) The apparatus of claim 1, wherein the property is resistivity.

9. (previously presented) The apparatus of claim 2,~~:~~ wherein the processor applies the chemometric estimated property to a Levenberg-Marquardt (LM) algorithm to determine a fluid parameter value for the fluid.

10. (original) The downhole tool of claim 10, wherein the fluid parameter value comprises a global minimum for the LM algorithm.

11. (currently amended) A method for determining a property of a fluid downhole comprising:

(a) positioning a resonator adjacent to ~~interacting a~~ the downhole fluid ~~with a resonator~~ ;

(b) actuating the resonator;

(c) measuring ~~receiving~~ a response ~~from~~ of the resonator to the actuation ~~of the resonator~~; and

(d) estimating a value of the property of the fluid ~~downhole~~ based on the measured ~~resonator~~ response.

12. (previously presented)The method of claim 11, further comprising:
estimating the fluid property using a chemometric equation.

13. canceled

14. (currently amended) The method of ~~claim 11~~ claim 12, further comprising:
~~deriving a chemometric equation from measured resonator response correlated~~
correlating the response with known fluid property values.

15. (previously presented)The method of claim 11, wherein the property is viscosity.

16. (previously presented)The method of claim 11, wherein the property is density.

17. (previously presented)The method of claim 11, wherein the property is dielectric constant.

18. (previously presented)The method of claim 11, wherein the property is resistivity

19. (previously presented)The method of claim 12, further comprising:
applying the chemometric estimated parameter value to a Levenberg-Marquardt (LM) algorithm to determine a fluid parameter value for the fluid.

20. (previously presented)The method of claim 19, wherein the fluid parameter value comprises a global minimum for the LM algorithm.

21-30 (cancelled)

31. (currently amended) A system for determining the properties of a downhole fluid, the system comprising:

(a) a surface controller ~~which~~ that lowers a tool deployed in a well bore formed in an adjacent formation, the tool interacting with a down hole fluid;

(b) a resonator ~~associated~~ in contact with the ~~down whole~~ downhole fluid;

(c) a controller ~~for actuating~~ that actuates the resonator; and

(d) a processor ~~which~~ that estimates a value of a property for the ~~down hole~~ downhole fluid using a response of the resonator.

32. (previously presented) The system of claim 3,:

wherein the processor uses a chemometric equation for estimating a fluid the property value.

33. (previously presented) The system of claim 32, wherein the processor applies a function applying the resonator response to a the chemometric equation to determine a the fluid property value.

34. (previously presented) The system of claim 31,wherein the processor uses a function for deriving a chemometric equation from measured resonator response correlated with known fluid property values.

35. (previously presented) The system of claim 31, wherein the parameter value property is viscosity.

36. (previously presented) The system of claim 31, wherein the parameter value property is density.

37. (previously presented)The system of claim 31, wherein the parameter value property is dielectric constant.

38. (previously presented)The system of claim 31, wherein the parameter value property is resistivity.

39. (previously presented) The system of claim 12, wherein the processor applies the chemometric estimated parameter value property to a Levenberg-Marquardt (LM) algorithm to determine a fluid parameter value for the fluid.

40. (previously presented) The system of claim 39, wherein the fluid parameter value comprises a global minimum for the LM algorithm.

41. (previously presented) The apparatus of claim 1 wherein the resonator comprises a mechanical resonator.

42. (previously presented) The apparatus of claim 1 wherein the resonator comprises a tuning fork.